USDA-ARS | U.S. Wheat and Barley Scab Initiative

FY21 Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-0-120
USDA-ARS Agreement Title:	Developing 6- and 2-rowed Malting Barley Cultivars with Reduced FHB and DON
Principle Investigator (PI):	Richard Horsley
Institution:	North Dakota State University
Institution UEI:	EZ4WPGRE1RD5
Fiscal Year:	2021
FY21 USDA-ARS Award Amount:	$203,584
PI Mailing Address:	North Dakota State University, Department of Plant Sciences NDSU Dept # 7670, PO Box 6050 Fargo, ND 58108-6050
PI E-mail:	richard.horsley@ndsu.edu
PI Phone:	701-231-8142
Period of Performance:	5/3/21 - 5/2/23
Reporting Period End Date:	5/2/2024

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON	$203,584
	FY21 Total ARS Award Amount	$203,584

I am submitting this report as an: ☒ Annual Report

I certify to the best of my knowledge and belief that this report is correct and complete for performance of activities for the purposes set forth in the award documents.

7/5/2023

Principal Investigator Signature — Date Report Submitted

‡ BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
EC-HQ – Executive Committee-Headquarters
FST-R – Food Safety & Toxicology (Research)
FST-S – Food Safety & Toxicology (Service)
GDER – Gene Discovery & Engineering Resistance
HWW-CP – Hard Winter Wheat Coordinated Project
MGMT – FHB Management
MGMT-IM – FHB Management – Integrated Management Coordinated Project
PBG – Pathogen Biology & Genetics
TSCI – Transformational Science
VDHR – Variety Development & Uniform Nurseries
NWW –Northern Soft Winter Wheat Region
SPR – Spring Wheat Region
SWW – Southern Soft Red Winter Wheat Region

Project 1: Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON

---

1. **What are the major goals and objectives of the research project?**
   The overall goal of this project is to develop two-rowed malting barley cultivars with enhanced resistance to FHB and reduced DON accumulation. Our goals for this project were: 1) continued development and screening of two-rowed barley lines in our breeding program for reduced FHB and DON, 2) growing the North American Barley Scab Evaluation Nursery (NABSEN) at our Osnabrock, ND research site, and 3) collect FHB and DON data on cultivars and advanced breeding lines that can be used by growers for making decisions on what cultivar(s) to grow.

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

   a) What were the major activities?

   Made 123 crosses to incorporate improved agronomic performance, end-use quality, and reduced DON accumulation.

   Evaluated 985 experimental barley lines in replicated yield trials at five locations in North Dakota.

   About 12,612 F_3 and F_4 head rows were grown that included material that had at least one parent in its pedigree that had reduced DON accumulation.

   b) What were the significant results?

   The two-rowed lines 2ND38344, 2ND39010, 2ND39092, 2ND39256, and 2ND39424 were submitted to the AMBA's Pilot Scale evaluation system. All lines except 2ND38344 were in their first year of Pilot Scale evaluation. 2ND38344 was in its second year of Pilot Scale evaluation. All lines were rated satisfactory. Lines found satisfactory in two years of Pilot Scale evaluation are eligible for Plant Scale evaluation. DON levels of all five lines was less than that of AAC Synergy, one of the most widely grown cultivars in ND.

   c) List key outcomes or other achievements.

   The two-rowed line 2ND36638 is undergoing its first year of Plant Scale evaluation by Rahr Malting in 2023. Cultivars found satisfactory in this final stage of evaluation are eligible for addition to the AMBA Recommended list of Malting Varieties. DON accumulation of 2ND36638 is intermediate to that of AAC Synergy and ND Genesis.

3. **What opportunities for training and professional development has the project provided?**
   Makenson Maisonneuve, an MS student from Haiti, is conducting research to update our genomic selection model for DON accumulation.

4. **How have the results been disseminated to communities of interest?**
   Results are disseminated via articles in peer-reviewed journals and popular press, field day presentations, and presentations to stakeholder groups at local and regional meetings.

Publications, Conference Papers, and Presentations

Please include a listing of all your publications/presentations about your FHB work that were a result of funding from your FY21 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period** should be included.

Did you publish/submit or present anything during this award period?

☐ Yes, I've included the citation reference in listing(s) below.

X No, I have nothing to report.

Journal publications as a result of FY21 award

List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like.

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published [include DOI#]; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Nothing to report

Books or other non-periodical, one-time publications as a result of FY21 award

Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis, or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Nothing to report

Other publications, conference papers and presentations as a result of FY21 award

Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication.

Nothing to report

In addition to the required inclusion in this report, to increase the visibility of your work we encourage you to also submit your publications in the new USWBSI ScabSource Publication Database, an open-access resource for all FHB researchers to reference.